Proposal for
Modification of Auxiliary-Data Display Equipment and AGC Separator Equipment

3 February 1958

CMCC Document No. 1133X5.55
Copy / of 12 Copies

(This document contains a total of 7 sheets, including this title sheet.)

1. General

The Auxiliary-Data Display Equipment (rack M) and the AGC Separator Equipment (rack N) are part of a data-reduction system which processes the data gathered by an airborne reconnaissance system known as System 4. This technical exhibit proposes modifications to these equipments which will provide greater flexibility of use, and will permit processing of the data with minimum degradation of signal-amplitude information.

2. The Original Data-Handling Concept

a. In the original data-reduction procedure, the data from master 14-channel magnetic tapes are re-recorded on duplicate 14-channel tapes. In a second operation, two different groups of data, each containing information from two different channels of the 14-channel duplicate tapes, are re-recorded on 3-channel magnetic tapes.

b. During the 14-channel-to-3-channel re-recording, the AGC Separator Equipment (rack N) selects two groups of agc data from the eight agc signals originally recorded on one channel of the 14-channel tape. Each of these groups has the agc data for two different receivers. The AGC Separator Equipment also receives the digital information containing frequency, antenna-direction, and activity data from another channel of the 14-channel tape. The agc data for each group is combined with the digital information, and each of the two resulting auxiliary-data signals is supplied for re-recording on one channel of separate 3-channel magnetic tapes. The 3-channel tape, therefore, has two channels, each containing the intercepted signals from a different receiver, and a third channel containing the related auxiliary data.

c. In a third operation, the Auxiliary-Data Display Equipment processes the combined auxiliary-data signal derived from one channel of the 3-channel duplicate tape and displays the frequency, antenna-direction, and activity information pertaining to the two receivers whose intercepted signals are recorded on the other two channels of the magnetic tape. In addition, the recorded intercepted signals are expanded by the equipment to approximately the same relative amplitudes which the signals had before being compressed by the agc action of the receivers of the airborne system. Each Auxiliary-Data Display Equipment can process simultaneously the data from two System-4 receivers.

d. The Auxiliary-Data Display Equipment can be used also to process data derived directly from the 14-channel master tapes produced by System 4, or from duplicates thereof. When used in this manner, it displays frequency, activity, and antenna-direction information but does not expand the intercepted signals.

3. Proposed Modifications, General

a. In addition to the functions described above, the proposed modifications to the AGC Separator Equipment (rack N) would provide eight detected agc-signal outputs which can be used to make a continuous oscillographic recording. Hence, the agc information recovered by the modified N rack working directly from the master 14-channel recording, would be available for visual analysis without the degradation introduced by re-recording. The modified N rack would also supply two sets of signals which may be used directly by two Auxiliary-Data Display Equipments to perform the signal-expansion function; thus, permitting this function to be performed without intermediate recording and readout, when so desired.

b. The proposed modifications to the Auxiliary-Data Display Equipment (rack M) would permit the equipment to operate from signals derived from 3-channel tapes as described above or, from signals which have been processed by the modified N rack and supplied directly to the M rack. In addition, two detected outputs suitable for oscillographic recording will be provided by each M rack.

4. Proposed Modifications of the AGC Separator Equipment (rack N)

a. The present model of the AGC Separator Equipment (rack N) separates the eight agc tones by means of band pass filters and amplifies and detects four tones selected from among the eight by four front-panel switches. The equipment re-modulates the selected information on carriers of different frequencies and the remodulated information is then added in pairs to the channel-12 signal for re-recording on two separate 3-channel tapes. Since the equipment must be able to operate with frequencies resulting from the playback of tapes at the original recording speed or at four times that speed, two sets of filters, oscillators, and modulators are provided, one set for each speed. Hence, the equipment includes 16 filters, four oscillators, and eight modulators. In addition, four amplifiers are used to drive either the four high-speed or four low-speed modulators which are operating at any one time.

b. The circuits required for these functions are placed in modules as follows:

1	Input transformer module
16	Filter modules
4	Amplifier modules
4	Oscillator - modulator modules
1	Output circuit module

c. In the modified N rack, eight d-c outputs which indicate the relative level of the agc voltages will also be provided to operate oscillographs. To affect this modification, a buffer amplifier and a detector will be added to each of eight filter modules (2.300 kc, 2.645 kc, 8.00 kc, 12.16 kc, 14.00 kc, 16.12 kc, 18.58 kc, and 20.92 kc). The input to each buffer amplifier will be the output of either one of the low-frequency (low-speed) filters or the corresponding high-frequency (high-speed) filter; i.e., the buffer amplifier and detector for the 18.58-kc filter-amplifier will also amplify and detect the output of the 4.65-kc filter-amplifier. These detected filter outputs will be supplied to individual BNC connectors on the front panel of the modified N rack.

d. In the modified N rack, the output of the filters may be used to operate the M-rack expander circuits. Hence, the filter assembly outputs selected by two of the four front-panel selector switches will be supplied to the terminals of each of two multi-terminal AN connectors located on the rear panel of the N rack. The channel-12 digital information for the modified M rack will be supplied through other terminals of these same connectors and will be obtained from the output circuit module in the modified N rack.

e. Physical changes required to modify the N rack will be as follows:

(1) Modification of nine modules - the modification to eight of these modules will be identical except for the actual filters used.

(2) Addition of eight BNC connectors to the front panel.

(3) Addition of two multi-terminal connectors to the rear panel.

(4) Additional wiring throughout the equipment to accommodate the above changes.

(5) Addition of two N-to-M inter-equipment cables.

5. Proposed Modifications of Auxiliary-Data Display Equipment (rack M)

a. The modifications to the Auxiliary-Data Display Equipment (rack M) consist of changes to permit the equipment to accept the output of modified N rack.

b. An additional multi-terminal AN connector will be added to the back panel of the processing unit of the M rack to receive the digital and agc information from the modified N rack. One terminal of the added connector, carrying the digital information, will be connected to the present auxiliary-input terminal to provide the input channel-12 signal. Other terminals of the connector, carrying the agc signals, will be connected by spare shielded leads in the inter-unit cables to the two display units. A switch will be installed on each display-unit front panel to select either the agc carrier from the N rack or to select the output of the 2.30-kc or 2.645-kc filter in the M rack. The agc signals are used to control the expander circuit.

c. The 2.30-kc and 2.645-kc filter assemblies and the agc gain (set level) control circuit in the M rack will be modified to provide uniformity of control action whether operated from the N rack, or from the M-rack filter outputs.

d. A BNC connector on the front panel of each display unit will be connected to one terminal of the set-zero control to provide a d-c output for oscillographic recording of the agc signal for the receiver whose data is being processed by the given display unit.

e. Physical changes required to modify the M rack will be as follows:

(1) Addition of one multi-terminal connector to the back panel of the processing unit.

(2) Addition of a single-pole-double-throw switch and a BNC connector to each display-unit front panel.

(3) Modification of two modules -- these modules are identical to two of the modules being modified in the N rack.

(4) Changes in wiring to accommodate the above modifications.